

07/31/98

Please type a plus sign (+) inside this box → ☒Approved for use through 09/30/2000. OMB 0651-0032  
Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE  
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.**UTILITY  
PATENT APPLICATION  
TRANSMITTAL**

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No. **005**First Inventor or Application Identifier **Brian I. Marcus**Title **Character Recognition Educational System**Express Mail Label No. **IB 411 521 352 US****APPLICATION ELEMENTS**

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: Assistant Commissioner for Patents  
Box Patent Application  
Washington, DC 20231

1. ☒ \* Fee Transmittal Form (e.g., PTO/SB/17)  
(Submit an original, and a duplicate for fee processing)
2. ☒ Specification [Total Pages **24**]  
(preferred arrangement set forth below)
- Descriptive title of the Invention
  - Cross References to Related Applications
  - Statement Regarding Fed sponsored R & D
  - Reference to Microfiche Appendix
  - Background of the Invention
  - Brief Summary of the Invention
  - Brief Description of the Drawings (if filed)
  - Detailed Description
  - Claim(s)
  - Abstract of the Disclosure
3. ☒ Drawing(s) (35 U.S.C. 113) [Total Sheets **9**]  
(Informal)
4. Oath or Declaration [Total Pages **2**]
- a. ☐ Newly executed (original or copy)
- b. ☒ Copy from a prior application (37 C.F.R. § 1.63(d))  
(for continuation/divisional with Box 17 completed)  
[Note Box 5 below]
- i. ☐ DELETION OF INVENTOR(S)  
Signed statement attached deleting  
inventor(s) named in the prior application,  
see 37 C.F.R. §§ 1.63(d)(2) and 1.33(b).
5. ☒ Incorporation By Reference (useable if Box 4b is checked)  
The entire disclosure of the prior application, from which a  
copy of the oath or declaration is supplied under Box 4b, is  
considered to be part of the disclosure of the accompanying  
application and is hereby incorporated by reference therein.

6. ☐ Microfiche Computer Program (Appendix)
7. Nucleotide and/or Amino Acid Sequence Submission  
(if applicable, all necessary)
- a. ☐ Computer Readable Copy
- b. ☐ Paper Copy (identical to computer copy)
- c. ☐ Statement verifying identity of above copies

**ACCOMPANYING APPLICATION PARTS**

8. ☐ Assignment Papers (cover sheet & document(s))
9. ☐ 37 C.F.R. § 3.73(b) Statement ☐ Power of Attorney  
(when there is an assignee)
10. ☐ English Translation Document (if applicable)
11. ☐ Information Disclosure Statement (IDS)/PTO-1449 ☐ Copies of IDS Citations
12. ☒ Preliminary Amendment
13. ☒ Return Receipt Postcard (MPEP 503)  
(Should be specifically itemized)
14. ☐ Small Entity Statement(s) ☒ Statement filed in prior application,  
(PTO/SB/09-12) Status still proper and desired
15. ☐ Certified Copy of Priority Document(s)  
(if foreign priority is claimed)
16. ☐ Other: .....

\* A new statement is required to be entitled to pay small entity fees, except where one has been filed in a prior application and is being relied upon.

17. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in a preliminary amendment:

☒ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No: **08,890,294**Prior application information: Examiner **Rovnak, J.** Group / Art Unit: **3712****18. CORRESPONDENCE ADDRESS**☐ Customer Number or Bar Code Label

(Insert Customer No. or Attach bar code label here)

or ☒ Correspondence address belowName **Brian I. Marcus**Address **52 Darrell Place, Apt. 1**City **San Francisco**State **CA**Zip Code **94133**

Country

Telephone **(415) 776-4250**

Fax

Name (Print/Type) **Warren S. Heit**

Registration No. (Attorney/Agent)

**36,828**

Signature

Date

**7/31/98**

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231.

<h1 style="margin: 0;">FEE TRANSMITTAL</h1> <p style="margin: 0; font-size: small;">Patent fees are subject to annual revision on October 1. These are the fees effective October 1, 1997. Small Entity payments <u>must</u> be supported by a small entity statement, otherwise large entity fees must be paid. See Forms PTO/SB/09-12.</p>		<b>Complete if Known</b>	
<b>TOTAL AMOUNT OF PAYMENT</b>		Application Number	<b>To be assigned</b>
(\$ <b>469.00</b> )		Filing Date	<b>July 31, 1998</b>
		First Named Inventor	<b>Brian I. Marcus</b>
		Examiner Name	
		Group / Art Unit	
		Attorney Docket No.	<b>005</b>

METHOD OF PAYMENT (check one)	FEE CALCULATION (continued)																																																																																																																																																																																		
<p>1. <input type="checkbox"/> The Commissioner is hereby authorized to charge indicated fees and credit any over payments to:</p> <p>Deposit Account Number <span style="border: 1px solid black; display: inline-block; width: 150px; height: 1.2em; vertical-align: middle;"></span></p> <p>Deposit Account Name <span style="border: 1px solid black; display: inline-block; width: 150px; height: 1.2em; vertical-align: middle;"></span></p> <p><input type="checkbox"/> Charge Any Additional Fee Required Under 37 CFR 1.16 and 1.17      <input type="checkbox"/> Charge the Issue Fee Set in 37 CFR 1.18 at the Mailing of the Notice of Allowance</p> <p>2. <input checked="" type="checkbox"/> Payment Enclosed:</p> <p style="margin-left: 20px;"> <input checked="" type="checkbox"/> Check    <input type="checkbox"/> Money Order    <input type="checkbox"/> Other                 </p>	<p><b>3. ADDITIONAL FEES</b></p> <table border="1" style="width: 100%; border-collapse: collapse; font-size: x-small;"> <thead> <tr> <th colspan="2">Large Entity</th> <th colspan="2">Small Entity</th> <th rowspan="2">Fee Description</th> <th rowspan="2">Fee Paid</th> </tr> <tr> <th>Fee Code</th> <th>Fee (\$)</th> <th>Fee Code</th> <th>Fee (\$)</th> </tr> </thead> <tbody> <tr><td>105</td><td>130</td><td>205</td><td>65</td><td>Surcharge - late filing fee or oath</td><td></td></tr> <tr><td>127</td><td>50</td><td>227</td><td>25</td><td>Surcharge - late provisional filing fee or cover sheet.</td><td></td></tr> <tr><td>139</td><td>130</td><td>139</td><td>130</td><td>Non-English specification</td><td></td></tr> <tr><td>147</td><td>2,520</td><td>147</td><td>2,520</td><td>For filing a request for reexamination</td><td></td></tr> <tr><td>112</td><td>920*</td><td>112</td><td>920*</td><td>Requesting publication of SIR prior to Examiner action</td><td></td></tr> <tr><td>113</td><td>1,840*</td><td>113</td><td>1,840*</td><td>Requesting publication of SIR after Examiner action</td><td></td></tr> <tr><td>115</td><td>110</td><td>215</td><td>55</td><td>Extension for reply within first month</td><td></td></tr> <tr><td>116</td><td>400</td><td>216</td><td>200</td><td>Extension for reply within second month</td><td></td></tr> <tr><td>117</td><td>950</td><td>217</td><td>475</td><td>Extension for reply within third month</td><td></td></tr> <tr><td>118</td><td>1,510</td><td>218</td><td>755</td><td>Extension for reply within fourth month</td><td></td></tr> <tr><td>128</td><td>2,060</td><td>228</td><td>1,030</td><td>Extension for reply within fifth month</td><td></td></tr> <tr><td>119</td><td>310</td><td>219</td><td>155</td><td>Notice of Appeal</td><td></td></tr> <tr><td>120</td><td>310</td><td>220</td><td>155</td><td>Filing a brief in support of an appeal</td><td></td></tr> <tr><td>121</td><td>270</td><td>221</td><td>135</td><td>Request for oral hearing</td><td></td></tr> <tr><td>138</td><td>1,510</td><td>138</td><td>1,510</td><td>Petition to institute a public use proceeding</td><td></td></tr> <tr><td>140</td><td>110</td><td>240</td><td>55</td><td>Petition to revive - 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SUBMITTED BY		Complete (if applicable)	
Typed or Printed Name	Warren S. Heit	Reg. Number	36,828
Signature		Date	7/31/98
		Deposit Account User ID	

**Burden Hour Statement:** This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

Express Mail No.: IB 411 521 253 US

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Application of: Brian I. Marcus  
Warren S. Heit

Continuation of Application: 08/890,294

Group Art Unit: Not Yet Assigned

Serial No.: Not Yet Assigned

Examiner: Not Yet Assigned

Filed: Concurrently Herewith

Attorney Docket No.: 005

For: CHARACTER RECOGNITION  
EDUCATIONAL SYSTEM

**PRELIMINARY AMENDMENT**

Assistant Commissioner for Patents  
Washington, D.C. 20231

Sir:

Applicants respectfully request entry of the following amendments and consideration of the following remarks prior to examination of the above-referenced application, which is a continuation of prior patent application 08/890,294 filed July 9, 1997.

**AMENDMENTS**

Please replace the title of the invention with the following:

--OBJECT RECOGNITION SYSTEM --

Please amend the specification as follows:

Insert before line 5 on page 1 the following:

--CROSS-REFERENCE TO RELATED APPLICATIONS

This is a continuation of United States patent application serial no. 08/890,294, filed July 9, 1997, issued \_\_\_\_\_ as United States patent no. \_\_\_\_\_, which was a file wrapper continuation application of United States patent application serial no. 08/581,437, filed December 29, 1995, now abandoned. A second continuation of United States patent application serial no. 08/890,294 titled "Method and Apparatus for Interacting With a Computer Using A Plurality of Individual Handheld Objects" has been filed concurrently herewith.--

Please amend the claims as follows:

Cancel claims 1-16.

Add the following new claims:

17. An object recognition system, comprising:  
a plurality of hand-held objects; and  
a device including a microprocessor for prompting selection of a particular hand-held object of said plurality of hand-held objects, for identifying a selected hand-held object of said plurality of hand-held objects, and for providing feedback based on said selected hand-held object.
18. An object recognition system as recited in claim 17, further comprising a platform for receiving said selected hand-held object, and for communicating a signal to said device representative of said selected hand-held object located on said platform.
19. An object recognition system as recited in claim 17, said feedback indicating a correct selection of objects where said selected hand-held object is the same as said

particular hand-held object.

20. An object recognition system as recited in claim 17, said feedback indicating an incorrect selection of objects where said selected hand-held object is not the same as said particular hand-held object.

21. An object recognition system as recited in claim 17, wherein each object of said plurality of objects includes an indicial mark on a surface of said object, and wherein said device prompts selection of an object including a particular indicial mark.

22. An object recognition system as recited in claim 21 wherein said indicial mark comprises an alphanumeric character.

23. An object recognition system as recited in claim 21 wherein said indicial mark comprises a braille character.

24. An object recognition system as recited in claim 18, wherein said plurality of hand-held objects comprise a plurality of blocks, each block of said plurality of blocks including at least one alphanumeric character on a surface thereof, said device prompting selection of blocks including particular characters to be positioned on said platform in a particular order.

25. An object recognition system, comprising:  
a plurality of hand-held objects;  
a platform for supporting a hand-held object manually selected from said plurality

of hand-held objects for placement of said platform; and

a device including a microprocessor operatively connected to said platform for providing feedback based on said hand-held object manually selected for placement onto said platform.

26. An object recognition system as recited in claim 25, wherein each object of said plurality of hand-held objects includes an indicial mark on a surface of said object, and wherein said device prompts selection of an object including a particular indicial mark.

27. An object recognition system as recited in claim 26, wherein said indicial mark comprises an alphanumeric character.

28. An object recognition system as recited in claim 26, wherein said indicial mark comprises a braille character.

29. An object recognition system for interacting with a computer, the system comprising:

a plurality of hand-held objects, each object of said plurality of objects including at least one indicial mark on a side of said object;

at least one emitter within each said object, said at least one emitter capable of actively emitting a first signal representative of said at least one indicial mark;

a platform for receiving a group of two or more objects manually selected from said plurality of objects, said platform capable of conveying at least a second signal representative of said indicial marks on said group of objects and a relative position of objects of said group on said platform; and

means for communicating said at least second signals to the computer.

30. An object recognition system for interacting with a computer as recited in claim 29, said group of objects being selected in response to prompting from the computer.

31. An object recognition system for interacting with a computer as recited in claim 29, wherein an indicial mark of said indicial marks comprises an alphanumeric character.

32. An object recognition system for interacting with a computer as recited in claim 29, wherein an indicial mark of said indicial marks comprises a braille character.

33. An object recognition system for interacting with a computer as recited in claim 29, wherein said plurality of hand-held objects comprise objects having six substantially planar surfaces.

34. An object recognition system for interacting with a computer as recited in claim 29, wherein said plurality of hand-held objects comprise tiles.

35. An object recognition system for interacting with a computer, the system comprising:

a plurality of hand-held objects, each object of said plurality of objects including at least one indicial mark;

at least one detector capable of detecting a first signal representative of said at least one indicial mark;

a platform for receiving at least one object manually selected from said plurality of

objects in response to prompting from the computer, said platform capable of conveying at least a second signal representative of said indicial mark on said object; and

means for communicating said at least second signals to the computer.

36. An object recognition system for interacting with a computer as recited in claim 35, wherein an indicial mark of said indicial marks comprises an alphanumeric character.

37. An object recognition system for interacting with a computer as recited in claim 35, wherein an indicial mark of said indicial marks comprises a braille character.

38. An object recognition system for interacting with a computer as recited in claim 35, wherein said plurality of hand-held objects comprise objects having six substantially planar surfaces.

39. An object recognition system for interacting with a computer as recited in claim 35, wherein said plurality of hand-held objects comprise tiles.

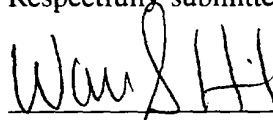


**REMARKS**

New Claims 17-39 are drawn to subject matter which has not been claimed previously in any of the related applications. The new claims do not introduce new matter, and they are fully supported by the specification and the claims as originally filed.

Applicants respectfully request that the above-made amendments be made of record in the file history of the instant application.

Respectfully submitted,

  
Warren S. Heit

Date July 31, 1998

36,828

(Reg. No.)

52 Darrell Place, Apt. 1  
San Francisco, CA 94133  
(415) 776-4250

CHARACTER RECOGNITION EDUCATIONAL SYSTEM

Inventors:

Brian I. Marcus  
Warren S. Heit

## 5

## Field of the Invention

The present invention relates to an educational system for teaching children language and/or arithmetic, and in particular to a system where a child arranges one or more computer-recognizable characters on a working platform to spell words or provide a mathematical result in response to computer generated questions or prompts, the system then indicating whether the words or mathematical result is correct.

## 15

20

There has been one segment of the population that has largely been excluded from the computer revolution, the young child. This is true primarily for two reasons. First, young children have not yet developed the mental capabilities or the motor skills to interact well with conventional computers, which require data to be entered, for example via the key board or mouse, in a fixed format. Secondly, young children are interested and entertained by simple sensory input, and the vast resources offered by conventional computers are generally too advanced to be of interest to them.

One simple sensory input of great interest to children is the sense of touch. It is why young children are commonly more interested in the box or wrapping of a gift than the actual gift contained therein. Several games have been developed which indulge a child's sense of touch, such as for example those including building blocks. Some such tactile systems also include letters in an attempt to educate a child while they are using the blocks. However, such tactile systems are ineffective without adult instruction as to what the letters represent. Moreover, the inventors of the present invention are unaware of any such tactile systems that work in combination with the vast resources provided by a computer.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide an easy to use, safe and fun computer data entry device for children.

5 It is a further object of the present invention to make learning enjoyable for children by providing an educational system including tactile blocks that may be handled by a child indulges a child's enjoyment of.

It is another object of the present invention to combine a tactile educational system with the vast resources provided by a computer.

10 It is a further object of the present invention to provide a system for educating children, which may be used by a child without the aid or presence of an adult, and which may be used by a child at his or her own pace.

15 These and other objects are accomplished by the present invention, which takes advantage of the fact that children enjoy the tactile feel of small hand-held blocks in combination with a system to teach them language and/or arithmetic. According to the invention, a working platform has a surface for receiving a plurality of blocks, which blocks include characters on one or more surfaces thereof. When a block is placed on the working platform, the platform is capable of recognizing the location of the block, and the identification of the block.

20 The blocks are designed to look and feel like the spelling blocks that are typically found on the market today -- i.e., they may be made of wood or plastic and easily fit into young child's hand; they have big, bright letters or

pictures or symbols etched or displayed in a variety of colors on one or more of the surfaces of the blocks.

Preferably, each block includes directly beneath the surface an identification device for each character on the block that is capable of transmitting a signal uniquely representative of the character. When a particular block is placed on the working platform in a particular location, a sensor associated with that location detects the identification of the block.

The working platform includes a data processing device such as a computer, and digital circuitry that receives as an input the location and the identification of the detected block. The digital circuitry converts this information into a computer usable form and sends it via a data line into the computer.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described with reference to the drawings in which:

FIGURE 1 is an isometric representation of the educational system according to the present invention;

FIGURE 2 is an isometric representation of an alternative embodiment of the educational system according to the present invention;

FIGURE 3 is a schematic representation of the processing device according to the present invention;

FIGURE 4 is a schematic representation of the character identification transmission system according to the present invention;

FIGURE 5 is an isometric view of the character identification and block location systems within the character blocks and working platform according to the present invention;

FIGURE 6 is an isometric view of the block location system within the working platform according to an alternative embodiment of the present invention;

FIGURE 7 is a top view of the block location system within the working platform according to an alternative embodiment of the present invention;

FIGURE 8 is a cross-sectional view of the embodiment of the invention shown in Fig. 7; and

FIGURE 9 is a schematic of a working platform controller according to an embodiment of the invention.

#### DETAILED DESCRIPTION

The present invention will now be described with reference to Figs. 1-9 which in general relate to an education system for teaching children or other individuals language and/or arithmetic. In a preferred embodiment, the system would be utilized by children to spell words and/or to indicate a mathematical result. However, it is understood that the present invention may be utilized by any individual to provide one or more computer-recognizable characters in a

desired sequence, generally in response to computer generated questions or prompts.

Referring now to Fig. 1, the present invention preferably includes a plurality of blocks 20, each containing an alphanumeric character on a surface thereof. The alphanumeric characters may include letters, numbers and/or punctuation marks. In an alternative embodiment of the invention, it is contemplated that the blocks 20 include pictures or symbols such as the sun, moon, animals, etc., in addition to or instead of the alphanumeric characters. In a further embodiment of the present invention, the blocks may include characters made up of raised dots that form braille letters, numbers and other braille characters.

A character on a surface of a block 20 may be defined by being a different color than the rest of the block surface surrounding the character. The character may additionally be raised or lowered relative to the block surface containing the character. In the embodiment of the invention including braille characters, the characters would of course be at a different elevation relative to the block surface surrounding the characters.

The blocks 20 are preferably formed of durable and wear-resistant material capable of withstanding substantial shock due to throwing of the block or other similar impacts. Moreover, the blocks are preferably formed of a non-toxic material to avoid injury in the event a child attempts to put the block in his or her mouth. A preferred material is any of several high strength polycarbonates. However, several other materials may be used, such as for



example wood and metal. Preferably, the material should allow character-recognition components, certain embodiments of which described hereinafter, to be included with the blocks 20 during block fabrication. Moreover, to make the blocks suitable for use by children, the blocks should be large enough not to fit entirely within a child's mouth, should have all edges rounded, and should be light weight to prevent injury if thrown. It is understood that the above-described characteristics of the blocks that make them suitable for use by children may be omitted in alternative embodiments of the present invention.

The blocks are used in conjunction with a processing device 22, which may include in part a conventional computer. As shown in the isometric view of Fig. 1 and the schematic representation shown in Fig. 3, the processing device 22 preferably includes a conventional data storage device 23 for storing data, a conventional monitor 24 for visual display, a conventional speaker 26 for audio playback, a working platform 28 for supporting the blocks 20 and for generating character-identification and block information, and a conventional central processing unit ("CPU") 30 capable of executing software instructions, and capable of communicating with the data storage device 23, the monitor 24, the speaker 26, and the working platform 28. It is understood that one or the other of the monitor 24 and speaker 26 may be omitted in alternative embodiments of the present invention. It is also understood that the data storage device 23 may be omitted in alternative embodiments of the invention.

Moreover, as shown in the alternative embodiment of Fig. 2, the processing device 22 may be contained within a unitary enclosure, the upper surface of which forms the working platform 28. In the embodiment shown in Fig. 2, the CPU 30, the data storage device 23, and the speaker 26 may be included within the enclosure.

Once a block is located on the working platform, the platform generates a signal for use by an application program running on the processing device 22 as explained hereinafter. The generation processes in the working platform are controlled by a microprocessor 55 (Fig. 9) in the working platform. As described in greater detail below, the microprocessor 55 scans the working platform for placement of one or more blocks thereon. Upon detection of the placement of a block on the working platform, the microprocessor 55 encodes the location and identification information into an encoded binary message. The message is then sent preferably over a dedicated line 32 to the processing device 22.

The line 32 is preferably bi-directional so the processing device 22 can send commands or other information to the working platform. For example, in the embodiments described below in which the working platform comprises a touch-sensitive display screen (preferably, flat panel), the bi-directional line allows the processing device 22 to display images on the flat panel screen to facilitate interaction between the application software and user thereof.

In an alternative embodiment, line 32 may be omitted and replaced by a wireless digital communication link between the processing device 22 and

working platform 28. Advantageously, according to this embodiment, the working platform may be used a greater distance from the processing device 22 without concern over extension wires.

Referring now to Figs. 1 and 4-5, each block 20 is capable of outputting  
5 a character identification signal that uniquely represents the character indicated on the upper surface of the block. The working platform 28 serves to support the blocks 20, to generate character identification information for a block based on the character identification signal output from that block, and also to generate location information indicating the location of a block 20 relative to  
10 each other block 20 on the working platform. The working platform forwards the block location information and the character identification information to the processing device 22 via the line 32 coupling the working platform 28 with the CPU 30. The working platform 28 further includes a button 34 which initiates the generation of the block location information and character identification  
15 information by the working platform, and also triggers the transfer of the information to the processing device 22. (In an alternative embodiment, in operation the block location information and the character identification information are continuously generated and transmitted to the processing device 22.) It is understood that structures other than button 34 may be used in  
20 alternative embodiments, such as for example a conventional mouse.

In operation, when a user of the system according to the present invention is finished arranging the blocks 20 on the platform 28, the user depresses button 34, and the generation and transfer of information is initiated.

In a preferred embodiment, the block location information and character identification information may be converted to a digital signal, which may be transmitted over the line 32 to the CPU 30. The block location and character identification information may be stored and transferred as a multiple bit word, containing both block location information and character identification information. It is understood that the number of bits used to transmit the digital signal may vary in alternative embodiments of the present invention.

The character identification information and the block location information may be generated by any of several known technologies. As shown in Figs. 4 and 5, each block 20 preferably includes a transmission system 36 mounted within the block proximate to a surface of the block opposed to the surface including the character. Known transmission systems are sufficiently small so as to allow one or more such systems to be provided within the block. In one embodiment of the present invention, the transmission system includes a receiver 38, a microprocessing chip 40, and a transmitter 42. The microprocessing chip 40 is powered by an energizing signal, in the form of an electromagnetic wave received from the working platform 28, as explained in greater detail below. Receipt of the energizing signal allows the transmission system to operate without an on-board power source. The energizing signal is received in the chip 40 via the receiver 38. Once energized, the chip emits the character identification signal including encoded information uniquely representative of the character on the block. The character information signal is forwarded by the transmitter 42 to the working platform 28, where the signal

is converted to a digital signal via an analog-to-digital converter (not shown). Systems such as transmission system 36 are commercially available from Sensor Engineering Co., Hamden, Connecticut 06517.

It is understood that other known technologies may be utilized to communicate the identity of the character on a block 20 to the working platform 28. For example, block 20 may include a transmission system 36 comprised of magnetically encoded data uniquely representative of the character on the block. The magnetically encoded data may be read by one or more sensors such as transducers provided within the working platform. In a further embodiment of the present invention, each block having a different character may have a different weight, which weight is sensed by the working platform to identify the character. It is further contemplated that the working platform and the surface of the block supported adjacent thereto may be transparent so that the transmission system may be any of various optical systems. It is understood that various other known technologies may be used to generate the character identification signal within working platform 28.

The blocks 20 may include between one and six characters on its respective surfaces. In a preferred embodiment, a block 20 will include a transmission system within the block for each of the characters on the surfaces of the block. Thus, for example, in an embodiment where a block 20 includes six characters, the block will include six different transmission systems, with each character/transmission system pair provided proximate to opposed surfaces from each other. It is understood that a block may include less transmission

systems than there are characters on the block. In such an embodiment, the transmission system will transmit a particular character identification depending on the orientation of the block 20 on the working platform, i.e., depending on which character was showing on the top surface of the block.

5           It is necessary to identify not only the character information, but also the location of a block on the working platform relative to other blocks so as to allow identification of whole words, phrases and/or mathematical results. Therefore, the working platform includes one of various known block location systems. In the embodiment shown in Fig. 5, working platform 28 includes a  
10       grid of readers 44. The grid of readers are intended to operate with the transmission system described above including receiver 38, microprocessing chip 40, and transmitter 42. Each reader emits the energizing signal described above to energize the microprocessor chip 40 of a block 20. The microprocessor chip then emits the character identification signal back to the  
15       reader via the transmitter 42, whereupon the signal is converted to a digital signal as explained above. Readers such as readers 44 are commercially available from Sensor Engineering Co., Hamden, Connecticut 06517.

          The readers 44 and transmission system 36 are configured such that a particular reader 44 will only receive a character identification signal from a  
20       block 20 if that block 20 is located proximately thereto. In one embodiment of the invention, a reader will only receive a character identification signal from a block located 2 to 4 inches away. With such a system, it is possible that more than one reader 44 will detect a particular block. However, based on the

number of readers within the working platform and the distance range over which a reader will detect a particular block, the microprocessor 55 is able to determine the location of the detected block 20 on the working platform. By identifying which reader receives a particular character identification signal, a block location signal associated with that character identification signal may also be generated.

It is understood that other known technologies may be utilized to generate the block location signal. For example, as shown in Fig. 6, a grid may be set up as described above, but comprised of a plurality of emitters 46 for emitting the energizing signal. The system may further comprise a single reader 47 for receiving a character identification signal. In order to generate the block location information signal, the microprocessor 55 may control the emitters 46 to fire the energizing signal one emitter at a time. Thus, breaking the emitter grid into a cartesian plane of x,y coordinates, the emitter at 1,1 fires the energizing signal at a time  $t_1$ . If there is a block 20 located thereabove, its chip is energized and a character identification signal is transmitted to the reader 47. Each emitter 46 fires the energizing signal at a different time. The time  $t$  at which each emitter fires its energizing signal is known. Thus, by identifying the time at which a character identification signal is received in the reader 47, the emitter 46 which caused the generation of the character identification signal may be determined, and the block location signal may thus be generated.

In a further embodiment of the present invention, the block location system within the working platform may comprise a single reader, such as for example one of the readers 44 shown in Fig. 5, capable of both transmitting an energizing signal and receiving a character identification signal. In this embodiment, the reader is mounted for translation so that the reader is moved across the entire surface of the working platform. When a character identification signal is sensed by the reader, the position of the reader is noted, and the block location signal associated with the sensed character identification signal is generated.

Grids of various other known configurations may be utilized in the block location system in alternative embodiments of the invention. For example, a grid of wires may be provided within the working platform, together with a single reader as described above capable of both transmitting an energizing signal and receiving a character identification signal. In this embodiment, in addition to transmitting the character identification signal, each block also emits a magnetic field. Thus, when a block 20 is placed on the working platform, a character identification signal is generated. The magnetic field of that block also generates a current in one or more of the wires of the grid, from which the location of the block may be determined. Alternatively, the grid of wires may be energized sequentially much in the same way as described in connection with Fig. 6 to induce a magnetic field to facilitated detection of the location and identification of the blocks.



A further embodiment of the present invention is shown in Figs. 7 and 8, where the position of each block 20 on the working platform may be determined by a pair of sensors 48a and 48b. The sensors 48a, 48b are preferably provided at the upper corners of the working platform. However, the sensors 48a, 48b may alternatively be located at the lower corners, at the left or right corners, or spaced from each other along a side of the working platform. When a reader 44 or an emitter 46 sends an energizing signal to energize a chip 40 as described above, the chip in this embodiment generates both a character identification signal and a proximity signal. The proximity signal is transmitted to both of the sensors 48a and 48b. Once a proximity signal is received in the sensors 48a and 48b, the signal may be used to determine the distance between the chip 40 and the sensors 48a, 48b, respectively, by known technology. Such technologies include surface wave acoustics, measurement of the EM field emanating from the chip, or measurement of the time it takes for the signal to reach the sensors 48a, and 48b. Once the distance between a block 20 and the sensors 48a and 48b, respectively, is determined, the precise location of the block 20 on the working platform 28 may be calculated by triangulation. It is understood that in an embodiment of the invention, the character identification signal may also act as the proximity signal.

As shown in the cross-sectional view of Fig. 7, the sensors 48a, 48b are preferably located in a lower portion of the working platform 28 so that the

proximity signal of a first block does not interfere with a proximity signal of a second block located between the first block and the sensors 48a, 48b.

It is understood that other known technologies for generating the character identification and block location information may be used in alternative embodiments of the invention. For example, a further embodiment of the invention incorporating many of the features previously described to identify the location and identification of the placement of a block on the working platform includes the use of a platform that is able to detect the image of the impression of the block on the platform, hereinafter referred to as image-sensitive platforms. Examples of image-sensitive platforms include touch-sensitive surfaces, such as those frequently used in many automated teller machines, or optically-sensitive screens, such as a screen employing one or more arrays of imaging mechanisms, such as charge-coupled devices.

In this embodiment, the placement of a particular block on the image-sensitive platform creates a unique impression on the image-sensitive screen. The location of this impression is also detectable by the microprocessor 55. For example, in touch-sensitive displays, the controller is able to identify the location of the impression by identifying the pixel or pixels associated with the impressions of the block on the platform. Similarly, in optically-sensitive screens, the controller is able to identify the location of the impression by identifying the array of charge-coupled devices detecting the impression of the block on the platform. The identification of this impression is also detectable by the microprocessor 55. By known imaging techniques, the controller can

compare the detected impression information with a plurality of images stored in memory to recognize the identification of the block.

In an alternative embodiment of the invention, the working platform may have a fixed number of discrete locations into which blocks may only be placed. This is preferably accomplished by providing a fixed number of indentations approximately the size of the block on the surface of the working platform. Typically, the indentations may be a quarter of an inch deep. The indentations may be arranged either in a single row or column or in a multi-dimensional array. According to this embodiment, there would exist only a fixed number of locations on the working platform in which a block may be located. There are advantages associated with this embodiment. Because there are only a fixed number of locations on the working platform in which a block may be placed, the generation of block location and identification information is simplified. In this embodiment, it is possible to have only one reader or sensor associated with each discrete location. The possibility that more than one reader or sensor will detect more than one particular block is greatly reduced or eliminated.

In operation, when a block is placed on the working platform and the microprocessor 55 has recognized its location and identification, a series of actions are set into motion. The microprocessor 55 encodes the location and identification information into a binary message compatible with protocols of today's personal computers. An example of such a protocol is set forth in Frank Van Gilluwe, *The PC Undocumented, A Programmer's Guide to I/O*,

*CPUs, and Fixed Memory Areas.* As shown on Fig. 9, the microprocessor 55 sends an encoded message over line 32. The line 32 is connected to the processing device 22 via any of the processing device's many input/output connectors (e.g., mouse connector, keyboard connector or the parallel or serial ports) A controller 56 in the processing device 22 receives the encoded message. The controller 56 translates the encoded message into a system value and places the value into a buffer 57. The controller 56 then issues an interrupt request via interrupt control 58 indicating that data is available in output buffer 57. The operating system of the processing device 22 or application program running thereon uses an interrupt to access the buffer 57 via CPU 30. Various interrupt functions are used to find and retrieve block information and to determine the block information in the buffer 57.

The controller 56 in the processing device 22 communicates with the working platform over line 32. A synchronized clock line is provided from the controller 56 to the working platform via microprocessor 55 when data are sent from the working platform. Preferably, information over line 32 is sent in an 11-bit serial frame consisting of a start bit, 8 data bits, an odd parity bit. and a stop bit. It is understood that different length frames and different configurations of the frames consistent with the processing device 22 are contemplated by the present invention. Internal to the working platform is a first-in-first-out buffer 59. Preferably, this buffer 59 holds up to 20 bytes of information although a platform buffer of smaller or great size is contemplated within the present invention.

In the idle state, both the data and clock lines are high. To begin sending the data to the processing device 22, the working platform sends the start bit on the line 32. The controller 56 responds by starting the clock line, with the first clock pulse going low. The clock is continued, with the working platform sending each bit in turn. At the 11th clock, the working platform sends the stop bit, and the clock line resumes its idle state.

Depending on the configuration of the working platform, the data sent from the working platform to the controller 56 normally includes one or more of the following: block identification information, block location information, and/or commands. A placement of a block on the working platform may result in the transmission of identification information alone, location information alone, or both identification and location information to the keyboard controller. While a block is moved on the working platform, the working platform transmits the identification of the moved block and the new locations of the block on the working platform. When a block is removed from the working platform, the working platform will transmit a removal code along with identification of the block removed.

In operation, the above-described hardware is preferably used with software applications which, in general, prompt a child to arrange the blocks 20 in a particular configuration on the working platform 28. The prompt can be, for example, a question that either appears visually on the monitor 24 or is played over the speaker 26. Once the child has arranged the blocks 20 in what he or she believes to be the correct response to the question, the button 34 is

depressed, the microprocessor 55 generates the character identification and block location information, and the result is sent to the CPU 30 (it is understood that the microprocessor 55 may continuously generates character identification and block location information as blocks are set down and lifted from the working platform). The CPU 30 then indicates to the child whether or not that response is correct. If the response is incorrect, the software can prompt the child to try again.

It is understood that the software may be written to ask a wide variety of questions, appropriate for children of various ages and educational levels. For example, the child may be prompted to spell a series of words, either audibly over the speaker, or by showing a picture of the object to be spelled on the monitor. In one embodiment, the software program may branch to more difficult or simple questions, depending on the number of correct previous answers. In a further embodiment intended for children first learning the alphabet, the child may randomly place a block on the working platform, and the software then audibly indicates the sound of the letter, and shows a number of words including that letter.

The applications software may be stored within the system on the data storage device 23, loaded onto the system from a floppy drive, or received into the system from a remote location over data transmission lines.

It is understood that the software and/or hardware according to the present invention may be provided for operation by individuals other than

children. For example, as indicated above, the characters on the surfaces of the blocks 20 may be braille characters to teach individuals the braille language.

In a further embodiment, the blocks 20 may comprise tiles having letters and numbers thereon such as those on the tiles of the board game Scrabble®.

5 In this embodiment, the processing device 22 may be configured to read words formed both vertically and horizontally, and the software may include an encoded dictionary in memory. Thus, the present invention may operate as an electronic Scrabble® game, where letter sequences are formed on the board, and the processing device 22 indicates whether the letter sequences in fact form  
10 words found in the stored dictionary.

Although the invention has been described in detail herein, it should be understood that the invention is not limited to the embodiments herein disclosed. Various changes, substitutions and modifications may be made thereto by those skilled in the art without departing from the spirit or scope of  
15 the invention as described and defined by the appended claims.

We Claim:

1. An educational system, comprising:
  - an object having at least one visually recognizable symbol thereon;
  - an emitter within said object for emitting a signal uniquely representative of said at least one visually recognizable symbol; and
  - an enclosure, including:
    - a surface for supporting said object, and
    - a processor, including means for receiving said signal from said emitter, said processor capable of identifying said symbol from said signal, and capable of identifying a position of said object on said surface.
2. An apparatus for entering data into a computer, the data being entered via the placement of a plurality of objects on the apparatus, each object having at least one unique item of detectable data associated therewith, comprising:
  - a surface for receiving the placement of an object;
  - one or more detectors capable of detecting the data associated with an object placed on the surface;
  - a line capable of communicating the detected data from the apparatus to the computer.





ABSTRACT OF THE INVENTION

A system where a child or other individual arranges one or more computer-recognizable characters on a working platform to spell words or provide a mathematical result in response to computer generated questions or prompts, the system then indicating whether the words or mathematical result is correct.

09107413-0001-0000

Fig. 1

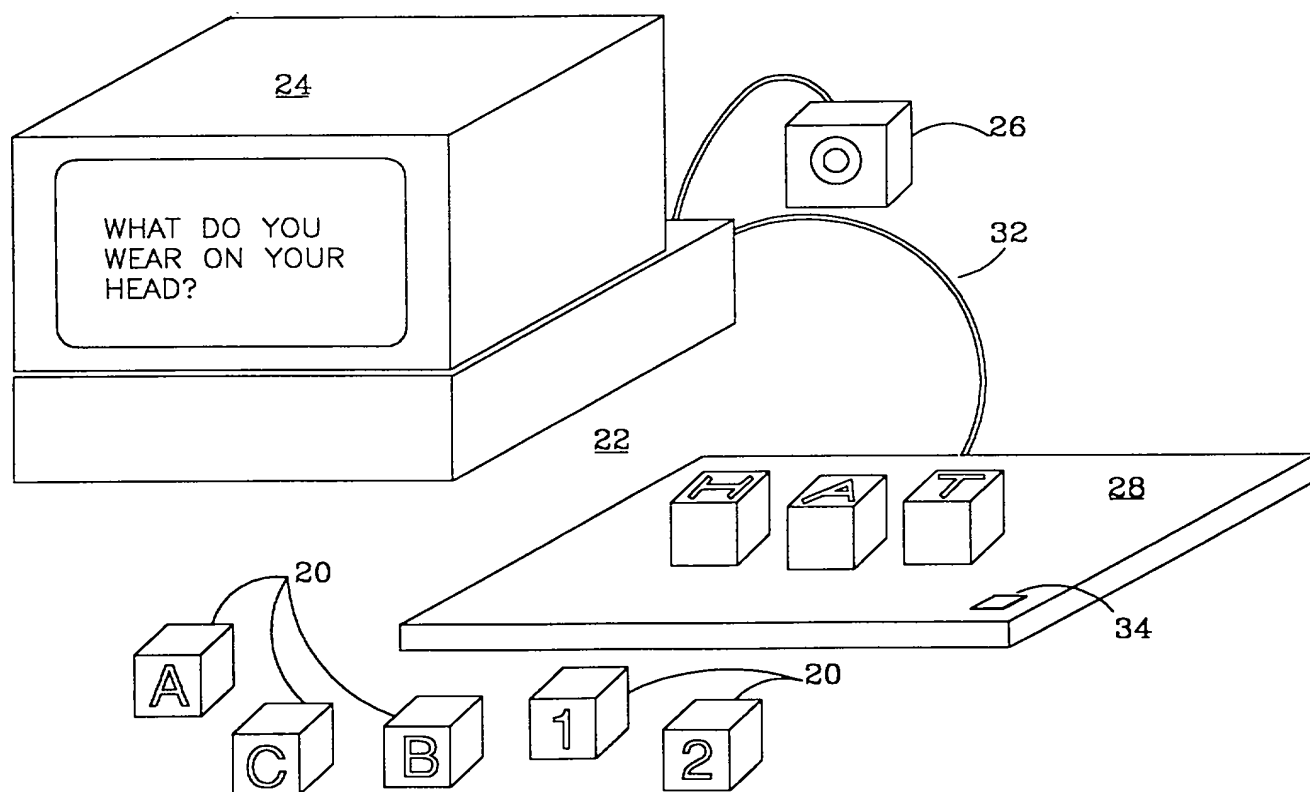


Fig. 2

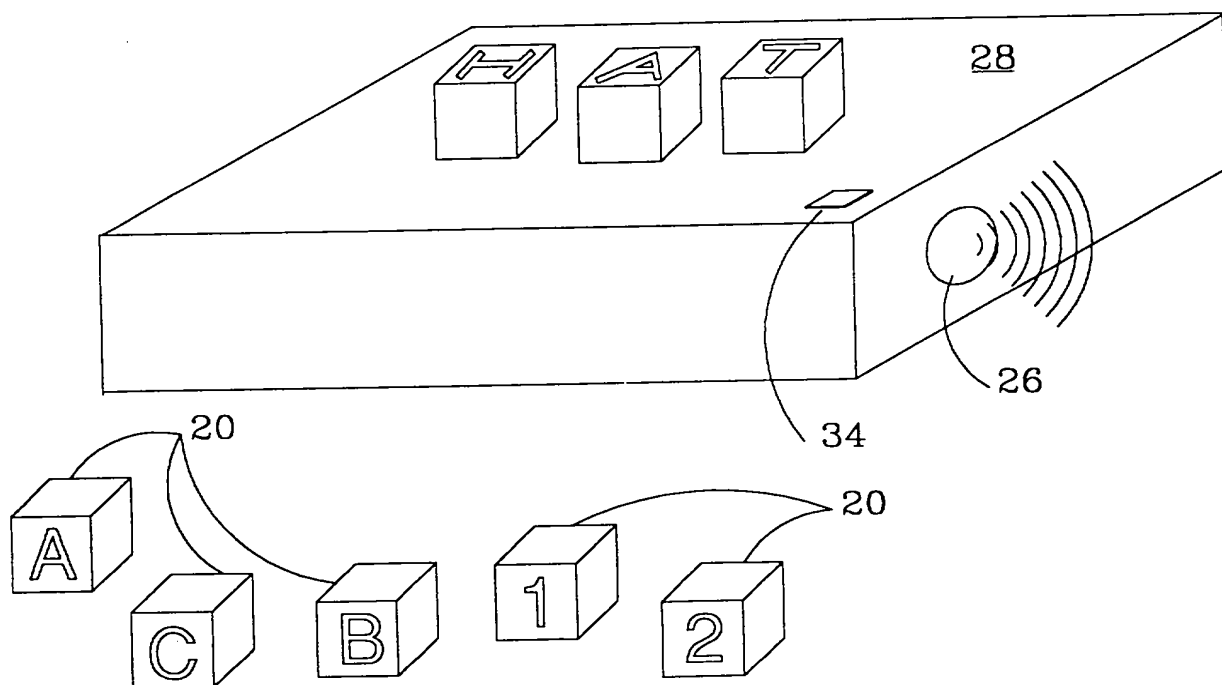
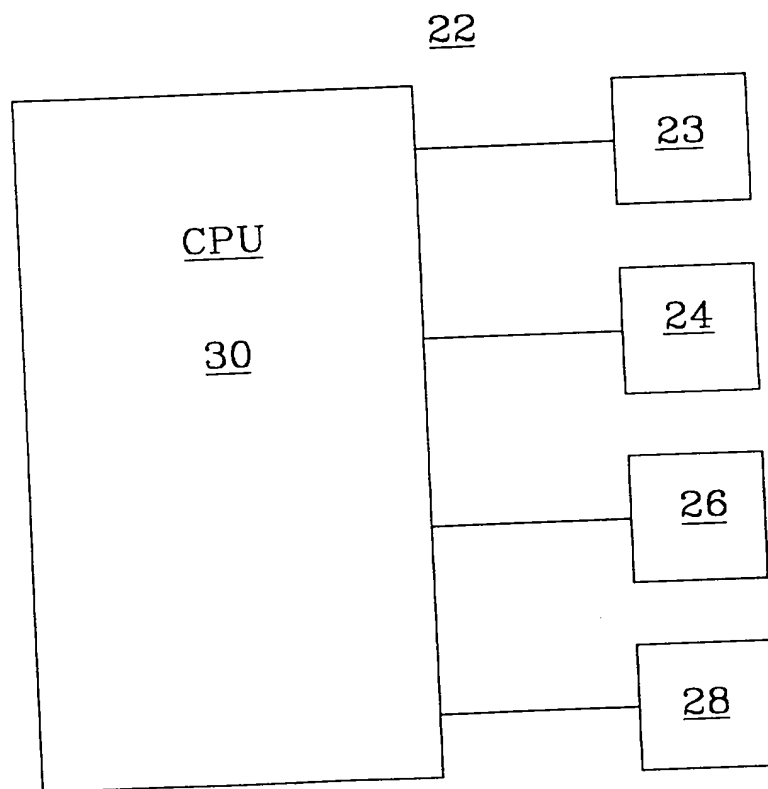


Fig. 3



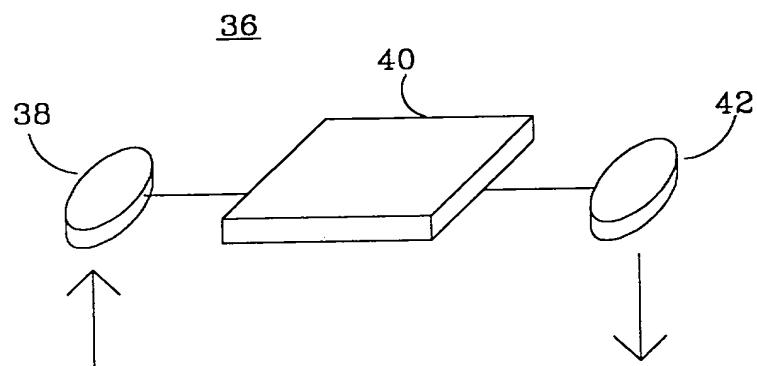


Fig. 4

Fig. 5

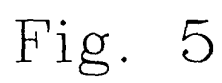


Fig. 6

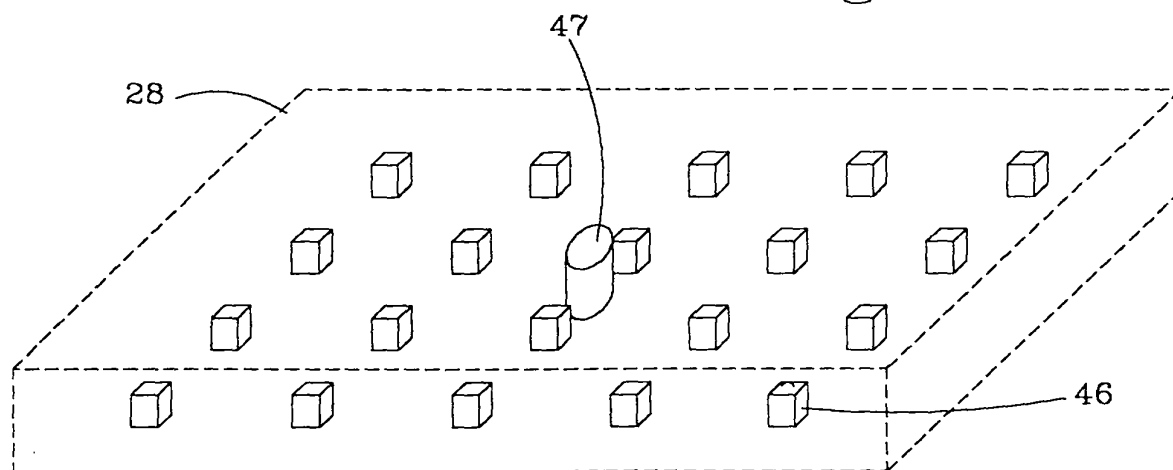
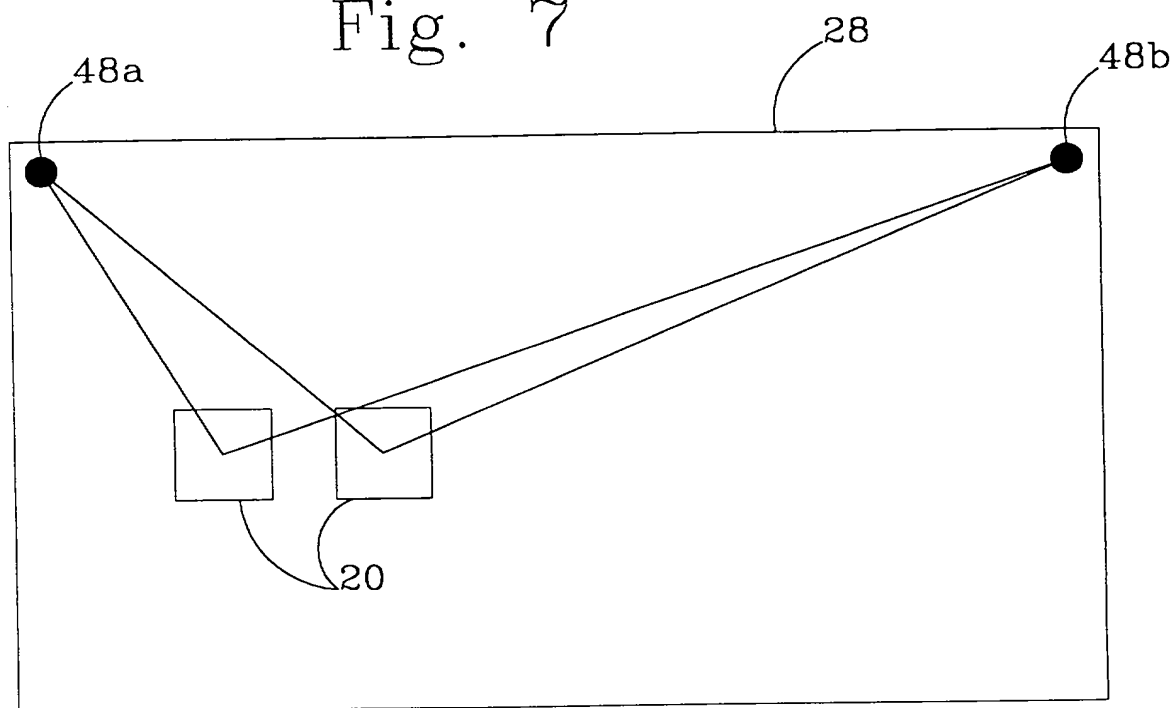




Fig. 7





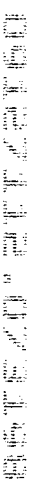


Fig. 9

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application ) PATENT APPLICATION  
)  
Inventor(s): Brian I. Marcus )  
Warren S. Heit )  
)  
SC/Serial No.: Not Yet Known )  
)  
Filed: Herewith )  
)  
Title: CHARACTER RECOGNITION )  
EDUCATIONAL SYSTEM )  
)  
)  
)  
)  
\_\_\_\_\_ )

DECLARATION FOR PATENT APPLICATION

As a below named inventor, I hereby declare that my residence, post office address and citizenship are as stated below next to my name; I believe that I am the original, first and sole inventor (if one name is listed below), first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

CHARACTER RECOGNITION EDUCATIONAL SYSTEM

the specification of which (check applicable ones):

  X   is attached hereto;  
       was filed with the above-identified "Filed" date and "SC/Serial No."  
       was amended on (or amended through) \_\_\_\_.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment(s) referred to above. I acknowledge the duty to disclose information which is material to the examination of the application in accordance with Title 37, Code of Federal Regulations, §1.56.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under §1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

(1) Full name of sole  
or first inventor: Brian I. Marcus

(1) Residence: 52 Darrell Place, Apt. 1, San Francisco, California 94133

(1) Post Office Address: (same as above)

(1) Citizenship: U.S.A

(1) Inventor's signature: Brian I. Marcus

(1) Date: December 29, 1995

\*\*\*\*\*

(2) Full name of second  
joint inventor: Warren S. Heit

(2) Residence: 2144 Green Street, Apt. A, San Francisco, California 94123

(2) Post Office Address: (same as above)

(2) Citizenship: U.S.A

(2) Inventor's signature: Warren S. Heit

(2) Date: December 29, 1995

\*\*\*\*\*

Title 37, Code of Federal Regulations, §1.56

**SECTION 1.56. DUTY TO DISCLOSE INFORMATION  
MATERIAL TO PATENTABILITY**

(a) A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclose information exists with respect to each pending claim until the claim is cancelled or withdrawn from consideration, or the application becomes abandoned. Information material to the patentability of a claim that is cancelled or withdrawn from consideration need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information which is not material to the patentability of any existing claim. The duty to disclose all information known to be material to patentability is deemed to be satisfied if all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by §§1.97(b)-(d) and 1.98.\* However, no patent will be granted on an application in connection with which fraud on the Office was practiced or attempted or the duty of disclosure was violated through bad faith or intentional misconduct. The Office encourages applicants to carefully examine:

- (1) prior art cited in search reports of a foreign patent office in a counterpart application, and
- (2) the closest information over which individuals associated with the filing or prosecution of a patent application believe any pending claim patentably defines, to make sure that any material information contained therein is disclosed to the Office.

(b) Under this section, information is material to patentability when it is not cumulative to information already of record or being made of record in the application, and

(1) It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or

(2) It refutes, or is inconsistent with, a position the applicant takes in:

- (i) Opposing an argument of unpatentability relied on by the Office; or
- (ii) Asserting an argument of patentability.

A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

(c) Individuals associated with the filing or prosecution of a patent application within the meaning of this section are:

- (1) Each inventor named in the application;
- (2) Each attorney or agent who prepares or prosecutes the application; and
- (3) Every other person who is substantively involved in the preparation or prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application.

(d) Individuals other than the attorney, agent or inventor may comply with this section by disclosing information to the attorney, agent, or inventor.

\* §§1.97(b)-(d) and 1.98 relate to the timing and manner in which information is to be submitted to the Office.

\*\*\*\*\*